

in the preceding part, to a formula deduced from theory, with the view of ascertaining how far they may tend to support that theory.

The third section is devoted to the comparison of the observations of the dip and variation of the needle with theoretical results of a more general kind. The observations made by Captain Back are peculiarly adapted for verifying the hypotheses on which the theories of terrestrial magnetism rest, and that theory, in particular, which assumes the existence of two magnetic poles, symmetrically situated in a diameter of the earth, and near to its centre: for, on this hypothesis, the poles of verticity and of convergence will coincide; and the tangent of the dip will be equal to twice the tangent of the magnetic latitude. In no case has a progress towards the magnetic pole been made so directly, and to such an extent, as in the present expedition; whether that point be considered as the point of convergence of magnetic meridians, or that at which the direction of the force is vertical. It is deducible from the theory that the product of the tangent of the dip by the tangent of the polar distance is equal to two: and therefore, if the distance of the pole of convergence from two stations be determined by means of the observed variations at those stations, we may estimate, by the approximation of this product to the number two, in each case, the degree of coincidence which exists between theory and observation. A table is then given, exhibiting the several data on which this comparison is made, and the results deduced from them. From an inspection of the numbers in the column which indicate the deviations from theory it appears that there is not, in general, that accordance between the observations and the theory which might reasonably have been expected; and that although that theory may serve as a first approximation, yet it requires to be considerably modified to reconcile it with the observations. Hence the author arrives at the general conclusion that, unless considerable errors have crept into the observations of either the dip or the variation, the theoretical pole of verticity does not coincide with the pole of convergence, even when the positions of these points are deduced from observations made at very limited distances from those poles.

“On the Safety-valve of the right Ventricle of the Heart in Man; and on the gradations of the same apparatus in Mammalia and Birds.”
By J. W. King, Esq. Communicated by Thomas Bell, Esq., F.R.S.

In this paper additional evidence is given by the author in corroboration of the principles which he had announced in a former communication, which was read to the Royal Society in May 1835, on the influence of the tricuspid valve of the heart on the circulation of the blood. His object is to demonstrate that the tricuspid valve in man occasionally serves the purpose of a safety-valve, being constructed so as to allow of the reflux of the blood from the ventricle into the auricle, during the varying states of distension to which the right cavities of the heart are at times subjected; that a similar function is maintained in the greater number of animals possessing a double circulation, and also that in the different orders of these animals the structure of this

valve is expressly adapted to the production of an effect of this kind, in various degrees, corresponding with the respective characters and habits of each tribe. He is thus led to conclude that the function which the tricuspid valve exercises exhibits, in the extent of its development, a regular gradation, when followed throughout the different orders of Mammalia and Birds; and that it extends even to some Reptiles.

The force with which the circulating blood is impelled by the general venous trunks into the heart, and which is dependent on the action of the arterial system, the degree of compression arising from muscular action, combined with the resistance of the valves of the veins, and is also influenced by occasional accumulations of blood from rapid absorption, from impeded respiration, and from cold applied to the surface of the body, is shown to be subject to great and sudden variations. Any increase taking place in this force tends to produce distension of the right ventricle of the heart, followed by disturbance in the valvular action of the tricuspid membrane, owing to the displacement of its parts, which thus allows of a considerable reflux of blood into the auricle. Among the Mammalia, the lowest degree of this action, corresponding to that of a safety-valve, is found in the rodent, the marsupial, and the canine tribes. The next in degree is that which occurs in the order of Edentata and the feline genus. The *Quadrumana* occupy the next place in the scale of gradation. The human conformation exhibits this function in a very conspicuous manner, especially in the adult period; for at birth, when the right ventricle is unyielding, it scarcely exists; and in various states of disease the tricuspid valve acts with too much or with too little efficacy. The *Pachydermata* and *Ruminantia* come next in succession. The Seal exhibits this peculiarity in a still higher degree; but in no order of Mammalia does it exist to so great an extent as in the *Cetacea*, which appear, indeed, to possess a peculiar additional provision for effectually securing the permanent performance of this office, which the author compares to that of a safety-valve. A similar function, subject to similar gradations, is likewise traced in different orders of Birds. It is but slight in the *Gallinacæ*; and rather greater in the *predaceous* tribes. In some of the *Waders* it exists to a considerable extent; but is greatest of all in the orders of *Passerinæ* and *Scansores*. Crocodiles and the *Ornithorhynchus* present some traces of this peculiar provision relatively to the circulation.

“Some Account of the appearances of the Solar Spots, as seen from Hereford, on the 15th and 16th of May, 1836, during and after the Solar Eclipse.” By Henry Lawson, Esq., in a Letter to Sir Henry Ellis, K.G.H., F.R.S., by whom it was communicated to the Society.

The spots on the sun's disc, at the period referred to, were very numerous; and one of great size, being many thousand miles in diameter, in particular attracted attention, from its penumbra presenting an appearance similar to a sky filled with small flocculent white clouds, perfectly distinct from one another; while on two sides were seen